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Notes on Oestrus, Ovulation and Pregnancy in the Mare

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During the spring and summer of 1947 a commercial stud of mares was maintained at this station for the collection of pregnant mares' serum. A breeding programme was designed primarily to obtain the maximum number of pregnancies as quickly as possible, while permitting the collection of clinical data regarding some aspects of reproduction in the mare and affording opportunities for an investigation of the possibility of regulating the oestrous cycle by hormonal agents. The results of these observations are presented below.

Material and Methods

THE STUD AND MANAGEMENT

In April, 1947, the stud comprised one thoroughbred stallion which had been used for breeding purposes in six previous years; eight mares, three of them in foal, which had been maintained in previous years as brood or riding mares; three working farm mares, one of which was in foal, and 17, mostly young mares, recently purchased for the production of pregnant mares' serum. With one exception the latter were all barren, and, although intended for breeding purposes, were completely unselected except for age.

Management of the stud was subject to some variation. The farm mares were in regular work and maintained accordingly. Many of the imported mares, which bore evidence of having wintered out, were in low condition and on admission to the stud were stabled in bails. The home brood mares had been boxed at night and run out by day during the winter, while the riding mares had been kept up, throughout. At the commencement of breeding all except the in-foal and working mares were stabled day and night and only grazed for a period of two to four hours daily. The in-foal mares were run out during the day until near to foaling and the farm mares were grazed only at week-ends. In addition to the grazing permitted during the actual mating period, the mares received a concentrate ration of 3 lb. oats, 2 lb. bran mixed with 2 lb. chopped hay given in two feeds, morning and evening, with an allowance of about 5 lb. of hay after bedding down at night. The stallion had been deliberately maintained in a low condition throughout the winter and was fed gradually increasing amounts of concentrates from March onwards, until, by early May, he was receiving approximately 9 lb. oats, 3 lb. bran and 3 lb. chop daily, in three feeds, with unlimited hay.

TRYING OF MARES AND DETERMINATION OF OESTRUS AND DIOESTRUS

All mares were held in a plain bridle with no further restraint and tried daily for evidence of oestrus, by teasing with the stallion over a board barrier. Trial was discontinued when termination of the acceptance period was evident and was resumed ten days later. Occasionally a mare was found to accept on the first day of trial so that the actual first day of acceptance was not determined, and, less commonly, it was found impossible to continue trying throughout the period to determine the end of oestrus. The incomplete records of such heat periods have not been included in the notes on the duration of oestrus.

The first day of voluntary acceptance of the stallion was recorded as the first day of oestrus and the period of acceptance as the duration of oestrus. The duration of dioestrus was defined as the interval between the termination of one oestrous period and the onset of the succeeding period and was recorded only when these limits were determined by daily trial.

DETERMINATION OF OVULATION

Rectal palpation of the ovaries was carried out daily from the onset of oestrus to observe follicular development and to determine the occurrence of ovulation. The number of palpable follicles and their estimated diameters were recorded daily for each ovary. No attempt was made to record follicles of less than 2 cm. diameter. Ovulation was recorded as having occurred when rectal palpation yielded definite evidence of the rupture of a previously identified, mature follicle.

MATING

All mares were mated at least once within 48 hours prior to ovulation and service was usually withheld until one or more follicles estimated to be not less than 4 cm. in diameter, were palpable in the ovaries. When clinical examination showed that ovulation had not occurred within 48 hours of the first service the mare was mated a second time. It was intended that every mare should be examined for evidence of ovulation before service, but occasionally, no examination could be made until several hours later. Under these circumstances, when ovulation had not occurred within 24 hours of the first service a second was given at the 48th hour, although the subsequent clinical examination occasionally showed that ovulation had occurred before this second mating, which was therefore unnecessary. Later in the season, mares which had proved persistently infertile were served repeatedly without regard to economy of service.

DIAGNOSIS OF PREGNANCY

Pregnancy was determined in all cases by rectal palpation of the uterus carried out independently by two observers between the 21st and 35th days after the last service.

HORMONES USED IN CONTROL OF CYCLE

The substances used were:—

(*a*) Chorionic gonadotrophin ("Luteinising Hormone" B. W. & Co.), given intravenously, at the time of service, in doses of 1,500 to 2,000 i.u., dissolved in 10 c.c. distilled water immediately before use.

(*b*) Stilboestrol dipropionate in oily solution, given intramuscularly in a dose of 15 to 25 mgm.

(*c*) Pregnant mares' serum (P.M.S., B. W. & Co.), given subcutaneously in a dose of 1,500 i.u. dissolved in 10 c.c. distilled water.

The Oestrous Cycle

DURATION OF OESTRUS AND DIOESTRUS

The onset of oestrus and its termination were readily determined in the majority of mares by trial with the stallion. The duration of oestrus was determined over 39 cycles in 20 mares. In 15 of these cycles, however, the mares had received 1,500 i.u. chorionic gonadotrophin at the time of service and the duration of oestrus in the two groups is discussed later. The average length of oestrus in all cycles was 5·3 days with a range of one to nine days. The duration of dioestrus was measured over 18 cycles in eight mares. The average duration was 16 days with a range of 11 to 21 days.

CLINICAL CHANGES IN THE OVARY DURING OESTRUS

On the first day of oestrus there was evidence of advanced follicular development in one or both ovaries. The number of palpable follicles varied considerably, but there were, commonly, not less than three follicles recognisable, their diameters ranging from 2 cm. to 4 cm. Although one follicle was usually more prominent than the rest, it was frequently noted that such follicles were not invariably destined to reach maturity, regression taking place as oestrus progressed, with ovulation resulting from the growth of an initially smaller follicle. Impending ovulation was frequently indicated by the change in consistency noted by other observers. The impression gained from the palpation of follicles just before ovulation was of a distinct fall in intra-follicular pressure. Examinations made less than 24 hours after ovulation usually showed the site of the ruptured follicle as a shallow crater occupied by a delicate spongy mass, while, less frequently, the site was occupied by a well-defined cavity into which the follicular wall could be depressed to admit the thumb. It seems probable that the latter clinical picture is presented only by very recent ovulations. Although no study was made of the developing corpora lutea it was noted that the structures could be recognised up to 72 hours after ovulation.

Ovulation

Analysis of Single and Twin Ovulations

The occurrence of ovulation was determined clinically in 46 cycles. In 35 of these cycles, single ovulations were recorded and in the remaining 11, the ovulation of two follicles was noted; twin ovulation was recorded as having occurred, with two exceptions, only when the site of two distinct follicles, 4 cm. or more in diameter, was occupied the following day by two palpable craters. Where these conditions had not been fulfilled, the occurrence and sites of double ovulations were deduced from the records of clinical examination at the fertile oestrus and from the recovery of twins at autopsy. This latter deduction disregards the possibility of a monozygotic origin for the twins. Except in one animal, there was no reason to believe that the ovulation of two follicles had not occurred simultaneously, but ovulation of a second follicle was confirmed, in one mare, 24 hours after the first recorded ovulation, and the clinical evidence suggested that the interval between these ovulations was not less than 12 hours.

Relative Activity of Left and Right Ovaries

From the above data it can be calculated that the site of 55 ovulations was accurately determined. In 35 instances of single ovulation, 22 occurred in the left ovary; of the ten twin ovulations for which information is available, four occurred in the left ovary, the remainder being divided between the two ovaries. In all, therefore, the distribution of ovulations between left and right ovaries was 36 to 19.

Ovulation in Relation to First Day of Oestrus

This relationship, which was studied in 26 cycles, is given in Table I.

Table I

The Relationship of Ovulation to the Onset of Oestrus

Days from commencement of oestrus Less than	1	1	2	3	4	5	6	7
Number of mares ovulating	1	1	2	4	5	6	4	3

Ovulation in Relation to Termination of Oestrus

The observations made on this relationship are given in Table II, which shows that in 30 cycles ovulation had occurred on, or before, the last day of acceptance. In the remainder, ovulation had not occurred at the time of last acceptance, but, although in six of these, evidence of ovulation was obtained 24 hours after the end of observed oestrus, it is possible that ovulation occurred within a few hours after trial and before the actual end of oestrus.

Table II

Relation of Ovulation to Termination of Oestrus

Time of ovulation relative to last acceptance (hours)	Before +72	Before 48-72	Before 24-48	Before −24	After −24	After 24-48	After +48
Number of cycles	2	5	13	10	6	1	-

Ovulation is seen to have occurred most frequently within 48 hours before the termination of oestrus.

Interovulatory period.—Eleven interovulatory periods were recorded for six mares. The mean interval was 21 days with a range of 15 to 24 days.

The Hormonal Control of the Oestrous Cycle

Chorionic Gonadotrophin and Ovulation

Twenty mares were injected with 1,500 i.u. chorionic gonadotrophin at the time of service. The occurrence of ovulation was recorded over 46 cycles and the distribution of single and twin ovulations in treated and untreated cycles is shown in Table III.

Table III

Effect of Administration of Chorionic Gonadotrophin on Ovulation

	Number of cycles	Ovulations Single	Ovulations Twin
Treated	20	13	7
Untreated	26	22	4

Of the 20 treated mares, 17 ovulated and the time of ovulation relative to the administration of the hormone is given in Table IV.

Table IV

Relation of Administration of Chorionic Gonadotrophin to Time of Ovulation

Time in hours from administration to ovulation.	Less than 24	24-48	48-72	72-96
Number of mares	3	13	1	-

Of the three mares which failed to ovulate, the first showed a cystic follicle which luteinised without rupture, the second was an aged mare which never showed a follicle greater than 3 cm. in diameter and the third (mare 5969) was injected on the first observed day of oestrus when a follicle 3 cm. in diameter was palpable in each ovary. Ovulation did not occur before the seventh day after injection when the mare was again served. It is probable that the follicles palpable at the time of injection had not developed sufficiently to respond to the gonadotrophic stimulation.

Chorionic Gonadotrophin and the Duration of Oestrus

The duration of oestrus was determined over 15 cycles in which ovulation followed the injection of chorionic gonadotrophin. The average length of oestrus was found to be 5·6 days. The corresponding figure for 24 untreated cycles was 5·1 days. The effect of the hormone on the termination of oestrus was studied in 17 mares over 20 cycles and these observations are summarised in Table V.

Table V

Relation of Administration of Chorionic Gonadotrophin to Termination of Oestrus

Duration of acceptance in days after administration.	1	2	3	4	5	6	7
Number of cycles	4	6	4	2	3	-	1

It should be pointed out that the three mares which showed acceptance for five days after administration all gave a doubtful response when tried with the stallion, so that the period of acceptance might have been shorter than that recorded. The mare (5969), accepting on the seventh day, had been injected on the first day of oestrus and has been discussed above. It will be noted that there was no deliberate attempt to shorten the oestrous periods of normal mares; clinical control was used to effect economy in services, the gonadotrophin was used primarily to guarantee ovulation in a correct time relation to service and its administration was frequently delayed until the fourth or fifth day of acceptance to ensure adequate follicle development. It is obvious that the duration of normal oestrous periods could not be shortened by such treatment.

Irregularities of the Oestrous Cycle

Failure to Show Heat

Although it was impracticable to try all mares throughout the season, failure to show normal cyclic oestrous behaviour was recognised in three mares.

Clinical evidence of recurrent physiological oestrus was obtained for mare 5962. This animal failed to show heat subsequent to her manifestation of oestrus, for one day only, on June 4th. Two attempts were first made to reinforce observed periods of physiological oestrus, by the subcutaneous administration of 1,500 i.u. P.M.S. and second, by the intramuscular administration of 15 mgm. stilboestrol dipropionate. Although there was no apparent response to either treatment, and ovulation without heat was observed on both occasions, oestrus, again only of one day duration, was manifest 23 days after the last observed ovulation and the service permitted proved fertile.

Mare 5957 was served at her third observed cycle on July 6th, and was tried daily, for evidence to return to the horse, from July 14th to 26th, her two previous dioestrous periods having been 15 and 11 days respectively. No evidence of heat was obtained. The mare was tried and subjected to daily clinical examination from August 14th to 29th. Follicular growth was apparent on August 27th and on August 29th a follicle more than 6 cm. diameter was palpable which, in the absence of signs of oestrus, was defined as a

cyst. The animal was treated by the intravenous injection of 2,000 i.u. chorionic gonadotrophin. Although ovulation failed to take place, palpation showed a change in the consistency of the cyst, indicative of some degree of luteinisation. This was confirmed by trocharisation *per vaginam*, on September 2nd; a quantity of bloody fibrinous exudate was removed but complete collapse of the cyst was not effected. The animal accepted the horse two days later on September 4th, and again on September 8th, when a further 1,500 i.u. chorionic gonadotrophin were administered. Ovulation was recorded in both ovaries on September 10th and a twin pregnancy confirmed on October 2nd.

Mare 5958 was a mare of uncertain temperament and was served under some restraint at her only observed heat period on May 27th. She was tried daily with the horse from June 10th until July 26th, and showed violent resentment of his approach at all times. In the stable she became increasingly difficult to handle, but this vicious behaviour could not be associated with cystic ovaries and clinical examination confirmed the occurrence of ovulation on July 24th, when a negative diagnosis of pregnancy was made. Her behaviour became increasingly difficult to interpret after this period. She was again tried daily from August 6th to September 13th but, although frequent evidence of oestrus was noted in the stable, she persistently refused to accept the horse. Fifteen mgm. stilboestrol dipropionate were administered intramuscularly on August 10th, 17 days after the observed ovulation, with the object of inducing sexual receptivity during the follicular phase. Rectal examination of the ovaries indicated that ovulation was suppressed, while her behaviour towards the stallion was unchanged. Clinical examinations of the ovaries were made daily and a further 25 mgm. stilboestrol dipropionate were administered on September 3rd, at the onset of a further period of ovarian activity. Oestrus was not induced but the vicious oestrous behaviour of the mare in the stable was exacerbated. On September 8th, 2,000 i.u. chorionic gonadotrophin were administered intravenously and ovulation occurred 24 hours later. There was some improvement in temperament during the next two weeks but mating of the mare was never achieved although she was tried daily with the stallion from September 22nd until the observance of an ovulation from both ovaries on October 6th.

Anovulatory Cycles

Ovulatory failure with the formation of cystic follicles was noted in two mares. The condition in mare 5957 has been described above. The second instance was in a farm mare which had proved persistently infertile in previous years. No observations were made on the behaviour of this mare until July 14th, from which date she was tried daily. Acceptance was first observed on July 21st, when the mare was served and injected intravenously with 1,500 i.u. chorionic gonadotrophin. Ovulation failed to occur and a large "cyst" of firm consistency was apparent. Oestrus terminated on July 24th, and recurred on August 12th. The mare was served daily and a further 1,500 i.u. chorionic gonadotrophin were injected intravenously on August 14th. Two follicles ovulated in the left ovary within 48 hours of injection and pregnancy was confirmed 30 days later.

Ovulatory failure at two successive oestrous periods was also noted in one old mare. The ovaries were large and firm in consistency, the largest follicle palpated was less than 3 cm. diameter, and the intravenous injection of 1,500 i.u. chorionic gonadotrophin at her last recorded oestrus failed to induce ovulation. The animal was discarded as sterile.

Mating and Conception

Of the 28 mares comprising the stud, conception was shown by clinical or *post-mortem* examination, to have occurred in 24 and information on the time of ovulation in relation to service is available for 20. Analysis shows that 19 ovulated within 48 hours after service, ten of these within 24 hours. The remaining mare was served less than 24 hours after ovulation and evidence of a recent pregnancy was obtained at autopsy by the recovery of foetal remnants.

From May 14th until June 4th, alternate mares were injected at the time of service with 1,500 i.u. chorionic gonadotrophin. During this period eight mares were served without treatment and nine mares were injected at service; three of the former and four of the latter conceived.

Examination of the breeding records for all 28 mares over the period covered by the observations shows that service was permitted at a total of 52 heat periods of which 19 were "treated," and 33 "untreated." Eleven conceptions were recorded following "treated" services and 13 from "untreated" services. A comparison of the number of conceptions resulting from first services shows that seven of 12 treated mares and six of 15 untreated mares conceived.

Although these differences are not significant, it will be noted that the advantages which might be gained from treatment under field conditions, were probably largely discounted by the close clinical control of mating in relation to ovulation, in untreated mares.

Foetal Migration

Implantation was known to have taken place in the right horn in 15 of 19 mares showing single pregnancies, implantation in the left horn was noted in two mares, and the site was not recorded in the remainder. Four of five twin pregnancies showed the implantation of one foetus into each horn; in the fifth mare, implantation of both conceptuses occurred in the right horn. Ovulation was recorded at mating for 15 of the mares carrying single pregnancies for which information is available on the site of subsequent implantation, and foetal migration had occurred in six mares. Two of the twin pregnancies were found in mares which had shown a double ovulation in the left ovary at the time of service. In one mare, one foetus was implanted into each horn, while in the second, both foetuses were implanted in the right horn. Foetal migration occurred, therefore, in eight of 20 mares studied and was in all cases from left to right.

Foetal Death

The clinical diagnosis of pregnancy was confirmed at autopsy in 18 mares which were examined between the 45th and 72nd days after service. An existing pregnancy was found in 15, two more showed evidence of recent resorption and one of recent abortion. One of the mares showing foetal resorption has been mentioned above; the foetal remnants were identified as such, by histological examination. Resorbing twin foetuses were recovered from the second mare and the presence of well-defined endometrial cups gave positive evidence of recent pregnancy in the aborting mare, which had been inseminated two days before in an attempt to effect superfecundation.

Pregnancy was determined clinically in six mares not slaughtered for serum production, but, in two of these, a subsequent negative diagnosis gave clinical evidence of the occurrence of foetal resorption. The diagnosis may be called into question but it must be pointed out that all clinical confirmations of pregnancy were made by two observers, and, in the case of one of the two mares, the presence of a twin pregnancy was recognised by the observer who was unaware that a twin ovulation had been recorded at the fertile oestrus. Termination of pregnancy before the 70th day was observed, therefore, in two of 19 single and three of five twin pregnancies.

Discussion

The observations on the duration of oestrus and dioestrus are, in general, in accord with those of Day[1] and of Andrews & McKenzie,[2] although it should be noted that these workers recorded oestrus of more than 30 days duration in individual mares. In the present series no mare exhibited oestrus for more than nine days but it will be borne in mind that these observations were commenced in mid-May, and Day has pointed out that long oestrous periods are more commonly experienced in the spring, when such behaviour usually marks the resumption of sexual activity after the winter anoestrus. The duration of dioestrus and the interovulatory interval were, necessarily, recorded for mares which failed to conceive readily and the figures given may not be representative. The interovulatory periods are of considerably longer duration than those recorded by Andrews & McKenzie, who observed that the most frequently encountered interval, in light and draught mares, was 17 and 18 days respectively. In my series, the mean duration was 21 days and only three, of eleven periods studied, were less than 20 days.

The observations on the relative activity of the right and left ovary are in agreement with those of Andrews & McKenzie and of Kedrov.[3] Particular evidence of the superior activity of the left ovary is suggested here by the findings with regard to multiple ovulation; the simultaneous ovulation of two follicles from the left ovary was noted on four occasions, while no multiple ovulation was recorded for the right ovary. The greater activity of the left ovary is of interest when related to the findings on foetal migration which was always observed in the one direction, from left to right—and both findings are in contrast to those of Day, who found no disparity of activity between the two ovaries and recorded the occurrence of foetal migration in both directions within the uterus. The observation, in one mare, of the migration of twin foetuses from left to right, appears to be of particular interest.

The observations on the relation of ovulation to the termination of oestrus appear to confirm those of other workers, in that, in the majority of recorded cycles, ovulation occurred in the 48 hours preceding the termination of oestrus.

The incidence of multiple ovulations observed in normal cycles (15 per cent.) is much higher than that reported by Andrews & McKenzie (3·8 per cent.) but is only about one half that recorded by Burkhardt,[4] who found evidence of its occurrence in 27 per

cent. of approximately 80 mares examined at autopsy. His suggestion, that a high incidence of twin ovulations in the mare represents a seasonal variation in ovarian activity, may explain their frequency in the present series, as all observations were made in the period May to late September, and Burkhardt states, without giving details, that multiple ovulation is rarely encountered before late May. Day, however, records no instance of the simultaneous rupture of two follicles in a series of 31 observed ovulations, although his protocols show that 24 of these were noted during the months of June, July and August, while, in a second series,[5] only one instance of multiple ovulation was encountered in a group of mares which were observed in the period July to November, six of them in the first three months of this period. One of these last six mares showed a triple ovulation after the intravenous injection of 3,000 i.u. chorionic gonadotrophin. Although the increased incidence of twin ovulations in mares treated here with gonadotrophin (35 per cent.), may be fortuitous, it is possible to interpret the observation as indicative of over-stimulation.

The findings on the induction of ovulation by the intravenous administration of chorionic gonadotrophin appear to confirm the results obtained by Day, Laing,[6] and Davidson,[7] and again emphasise the need to withhold administration until follicular development has established responsiveness to stimulation. There seems general agreement that responsiveness has usually not been established in follicles less than 3 cm. in diameter. On the other hand, Mirskaya & Petropavlovsky[8] have reported that follicles of 1 cm. or more in diameter almost invariably ovulated in response to two subcutaneous injections of 500 m.u. chorionic gonadotrophin, given at an interval of eight to 12 hours. It would appear that administration by the subcutaneous route warrants further investigation, as it seems possible that a more gradual stimulation might be thus achieved, which would eliminate the small incidence of ovulatory failure encountered following intravenous administration.

It is clear, from the observations made on mares which failed to show recurrent oestrus, that treatment must be undertaken only after careful clinical analysis has established the physiological status of the individual animal. The failure to induce oestrus in mare 5962, either with P.M.S. or oestrogen, may have been due to an inability to assess dosage requirements with sufficient accuracy. The value of these agents in the treatment of mares showing "physiological oestrus" appears to have been established by other workers,[9, 10, 11] but some variability of response has also been noted, and Day, and Burkhardt have emphasised the need for a precise evaluation of the dosage requirements of the individual animal. The results of the treatment of cystic follicles by puncture and gonadotrophic therapy provide further evidence of the value of the treatment recommended by Day.[12] The failure of mare 5958 to accept the horse, although manifesting constant oestrous behaviour in the stable, is a condition usually associated with ovulatory failure. In her case, however, ovulation was known to occur on more than one occasion without any marked recession of the vicious oestrous behaviour. Hignett[13] has remarked that nymphomania may be encountered in mares showing no obvious ovarian dysfunction and that ovariectomy frequently fails to terminate this type of oestrous behaviour. It seems possible that oestrogen may be produced at some site other than the ovary to induce such abnormal sexual behaviour and that such extra-ovarian oestrogen may attain levels at which inhibition of ovulation would be effected. Such mares would thus conform to the clinical picture of the nymphomaniac mare with "cystic ovaries."

Several interesting aspects of pregnancy in the mare were presented in the animals under observation. The occurrence of foetal resorption in four of 24 pregnancies, before the 70th day, suggests a degree of gestational vulnerability at this time. It has been established that the primary corpus luteum of pregnancy in the mare has a functional life of approximately 40 days.[14] It has also been shown that between the 40th and 70th day of pregnancy, crops of new corpora lutea are formed, as the result of ovulatory activity, initiated by the high level of gonadotrophin circulating in the blood[15] and that ovarian activity then diminishes until about the 150th day, when it is in complete abeyance.[16] It would seem that after this time, the responsibility for fulfilling the hormonal requirements of gestation no longer rests with the ovary. If this picture represents the true state of affairs, then it may explain, in some degree, the vulnerability which is under discussion. It is conceivable that the possibilities of gestational failure will be greater in an animal whose progesterone production is maintained by such a sequence of functional events, than in a species where the demands of pregnancy are being met as the result of continuous secretion from a single persistent site.

Clinical and *post-mortem* findings showed the occurrence of twin conception in five of 24 pregnancies. Blakeslee & Hudson[17] have recorded a twin conception rate of 3·2 per cent. with a live birth-rate of 0·5 per cent., while Koroljkov[18] has given the figures as 5 per cent. and 1 per cent. respectively, and Craft[19] has given the twin birth-rate as 1·1 per cent. There is general agreement that, in the mare, a twin pregnancy is most frequently terminated by abortion, but the present findings suggest that the incidence of twin conceptions in the mare may be considerably higher than has been previously reported and that there may exist, as a sequel, a high incidence of unobserved foetal death. It is also suggested that this incidence may be actually increased by the induction of multiple ovulation at the time of service, as a result of over-stimulation by gonadotrophins, and it would follow that the hormonal regulation of ovulation in the mare may need further study to determine the dosage levels at which controlled stimulation may be achieved.

Summary

The paper records the findings derived from a study of the reproductive cycle of the mare in a stud of 28 animals maintained for the production of pregnant mares' serum. Management of the stud is described and data are presented recording observations made on the oestrous cycle and its hormonal control, with notes on the application of endocrine substances in the correction of irregularities of the cycle. Information is also presented on some aspects of pregnancy in the mare including the occurrence of foetal migration and foetal resorption. The findings are discussed.

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LICENSING OF STALLIONS

The Minister of Agriculture and Fisheries and the Secretary of State for Scotland have made an Order under which Part II of the Animals Act, 1948, will come into operation on January 1st, 1949. (*Vet. Rec.* **60.** 238.) On and after that date a licence or permit will be required for the keeping in Great Britain of any stallion two years old or over apart from the following classes:—

(1) Stallions foaled before January 1st, 1945.

(2) Thoroughbreds and Shetland ponies.

(3) Various breeds of hill, mountain and forest ponies, so long as they are kept in areas corresponding broadly to those where ponies of the breed are normally allowed on free range.

Stallions in these three classes will require a licence if they are travelled or exhibited for service away from their owners' premises.

The Horse Breeding Rules, 1948 (Statutory Instrument No. 2677) (Price 3d.), describe the procedure for making application for a licence or permit for the keeping of a stallion.

Copies of a memorandum explaining the effect of the Act and the Rules in greater detail may be obtained on application to the Secretary, Ministry of Agriculture and Fisheries, Livestock Supplies Branch, 14, Chester Terrace, Regent's Park, London, N.W.1, or to the Secretary, Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1.

The Differentiation of Meats by the Precipitation Test

By

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The substitution of inferior meat for that of a higher quality, such as horse flesh for beef, is a type of fraud commonly encountered, especially in times of scarcity. To detect any such deception is not always an easy task, particularly when the meat is cut into small pieces or is so prepared that anatomical features are not outstanding or are missing altogether.

The glycogen test, based on the assumption that horse flesh contains more of this polysaccharide than any other meat, is not conclusive, as the flesh of foetuses, starved calves and dogs, and the liver, especially that of pigs, also contain a fair amount. Furthermore, the percentage of glycogen in horse flesh is not stable, so that it is quite often as low as in other meat. The presence or absence of this polysaccharide, therefore, constitutes no guide.

The biological method, based on a precipitation of specific proteins, although by no means perfect, deserves serious consideration, particularly as its practical application does not present any major difficulties and may be carried out in any abattoir laboratory. Although the method has received much attention in literature on the subject of bacteriology, it has been neglected in text-books and literature on meat and food inspection.

Technique

According to the German legislation[10] the standard method of precipitating the specific protein in meat is as follows:—

About 30 grammes of pure meat is cut into small pieces, placed in a sterile flask, covered with 50 c.c. of normal saline and separated by a glass rod to avoid shaking. The flask is left for about three hours at room temperature or overnight in a refrigerator. After that time a check is made to ascertain whether the extract contains enough albumin or if further extraction is required. For this purpose, approximately 2 c.c. of the extract is placed in a test tube and vigorously shaken. If the developing foam consists of small bubbles which remain intact for some time, the albumin concentration may be regarded as satisfactory and the extract passed through stiff filter paper or, if necessary, through a Berkfeld or a Buchner filter.

The concentration of albumin in the filtrate is then checked by boiling about 1 c.c. and adding one drop of nitric acid (S.G. 1153). An albumin concentration in the extract of about 1 in 300 is satisfactory and with this the opalescence which develops after adding the nitric acid should sink as delicate floccules to the bottom of the tube in about five minutes. Should the filtrate be too concentrated as shown by the density of the precipitate, it has to be diluted by the addition of normal saline. The *p*H has now to be ascertained and should be between 6·0 and 7·0, as one which is outwith this range may interfere with the test. To correct it, sodium bicarbonate, magnesium oxide or N/20 HCl is used.

The filtrate so prepared is now ready for precipitation. Into a rack are placed six test tubes 11 cm. long and 0·8 cm. in diameter. Tubes Nos. 1 and 2 are filled with 1 c.c. of the suspected filtrate, tubes Nos. 3, 4 and 5 with 1 c.c. of a specific filtrate obtained from the extraction of horse flesh, beef and pork respectively, and tube No. 6 with 1 c.c. of normal saline. To all but No. 2, 0·1 c.c. of anti-horse serum, prepared by one of the recognised methods of intramuscular, intravenous or intraperitoneal injections of rabbits with specific meat juice, is now added. This is done with a sterile pipette, allowing the serum to run along the wall of the test tube so that it may accumulate at the bottom. To test tube No. 2 which serves as a control, 0·1 c.c. of clear normal rabbit serum is added. If, after five minutes, a nebula develops at the bottom of tubes Nos. 1 and 3 which after another five minutes becomes a definite cloudiness, while the rest of the tubes remain clear, the suspected meat extract contains horse flesh.

Experimental Observations

During the past few months a large number of routine tests have been carried out in this Department on behalf of the Edinburgh Corporation Veterinary Department, and as a result of the experience obtained, modifications of the above technique have been adopted which give better results and simplify the method.

(*a*) Sampling:

The amount of meat taken for the test depends mainly on the size of the sample sent in for examination. While 30 grammes as suggested above is satisfactory, smaller portions such as 20 grammes or 10 grammes will serve equally well, provided the amount of saline is kept in proportion. Difficulties have been found, however, in the case of small amounts of meat products sent in for examination, as, for instance, in sausages where the percentage of meat is often negligible.

(*b*) Extraction:

According to the German legislation, the 30 grammes of meat are extracted with 50 c.c. of normal saline. This proportion has been adopted for the extraction of meat products having as their main constituents water-absorbing cereals, such as the present day sausages. For the extraction of pure meat, however, it has been modified to equal amounts of saline and meat, as the filtrate so prepared shows as a rule a slightly better albumin concentration and, therefore, gives a more pronounced precipitation ring in the final test (Tables I and II).

Table I.—Effect of Concentration on Precipitation Reaction

Meat g.	Saline c.c.	Time of extraction	Precipitation reaction	Time of appearance of precipitate
1	100	3 hours	Very weak	Instant-aneously or up to 20 minutes
11	10	"	Weak	
5	5*	"	Very strong	
30	30	"	"	
30	50	"	Strong or very strong	

* Quantity insufficient

Table II.—Effect of Time of Extraction on Concentration of Albumin

(*a*) Equal parts of meat and saline

	After 3 hours at room temp.	After 24 hours at 8° C.
Horse flesh ..	0·2640 per cent.	0·1826 per cent.
Beef	1·317 "	1·953 "
Mutton	0·595 "	1·646 "

(*b*) 30 : 50 meat and saline

	After 3 hours at room temp.	After 24 hours at 8° C.
Horse flesh ..	0·8537 per cent.	0·8354 per cent.
Beef	0·1592 "	0·5740 "
Mutton	0·5741 "	0·9215 "

The period of extraction varies with the material. While pure meat extracts well enough during three hours at room temperature, sausages require much longer—anything from 18 to 24 hours in a temperature of about 8° C.

(*c*) Examination of the Extract:

The value of the antigen depends on its albumin concentration. The German legislation provides that both the extract and the filtrate should be examined for the presence of protein. The methods described above are quite satisfactory, but the author prefers the Xanthoproteic test which is more reliable. This requires 2 to 3 c.c. of extract. After 1 c.c. of concentrated nitric acid is added, a precipitate develops giving the solution a yellow colour. The test tube and contents are now cooled and sodium or ammonium hydroxide is added in excess whereby the yellow colour is transformed to orange.

If either the extract or filtrate is too concentrated as seen by the density of the precipitate, it has to be diluted with normal saline (Schönberg, 1945). This sounds simple but in practice it may prove troublesome and to simplify this part of the test the author adopted a similar technique to that used in the agglutination test: 0·2 c.c. of the extract after filtration through Whatman's Filter Paper No. 1 or 2 is transferred with a graduated pipette into a small (3 by ½ in.) test tube and thoroughly mixed with 0·8 c.c. of normal saline, thus giving a 1:4 dilution. From this 0·5 c.c. is withdrawn and transferred to a second tube to which 0·5 c.c. of saline has been added giving a 1:8 dilution. If necessary, this is continued with another two tubes bringing the dilutions up to 1:16 and 1:32. The antigen so obtained is clear and the first two tubes, especially, usually show a satisfactory albumin concentration and *p*H in the required range. Thus reagents to rectify the hydrogen-ion concentration and the addition of indeterminable amounts of saline for the dilution of the antigen can be dispensed with. Furthermore, it is superfluous to carry out two protein tests, *viz.*, one of the extract and one of the filtrate. In the case of pure and fresh meat samples which have been properly extracted, the examination of the extract for its protein concentration and *p*H may be abandoned. It is advisable, however, in such cases to carry out precipitation tests

not only with the 1:8 dilution but also with the 1:4 and the undiluted filtrate. This little extra work serves as a check and will be of value should the dilutions prove to have too little albumin.

(*d*) Dilutions:

Instead of using test tubes 11 cm. long which require 1 c.c. of filtrate and 0·1 c.c. of antiserum, the author uses Dreyer's agglutination tubes, the lower ends of which are conical and, therefore, require only 0·01 c.c. of the specific antiserum and an equal amount of antigen. The reaction obtained in this way is much more easily read and it is a saving from the financial point of view as the specific antiserum is quite expensive. An extra Pasteur pipette has to be used for putting the antiserum into the Dreyer's tube. To begin with the highest dilution is used, finishing with the undiluted filtrate. Contrary to the German technique, the specific antiserum is pipetted in first at the bottom of the tube and the filtrate very carefully superimposed, as mixing of the two reagents interferes with the precipitation reaction. If the result is positive, a whitish ring develops at the interface of the two reagents almost immediately and certainly within five to 20 minutes. Any precipitation ring which appears after this time is not reliable as it may be due to a non-specific reaction.

The arrangement of the tubes containing the specific antisera has also been slightly changed as follows so as to make the reading easier and at the same time more accurate (Table III and Fig. 1).

Table III: Order in which the Precipitation Tubes are Placed.

1.	Anti-horse serum	
2.	Anti-cow serum	
3.	Anti-sheep serum	
4.	Anti-pig serum	(Only if pork is present)
5.	Anti-dog serum	(Only if dog meat is suspected)
6.	Normal rabbit serum	(Controls)
7.	Anti-horse serum	"

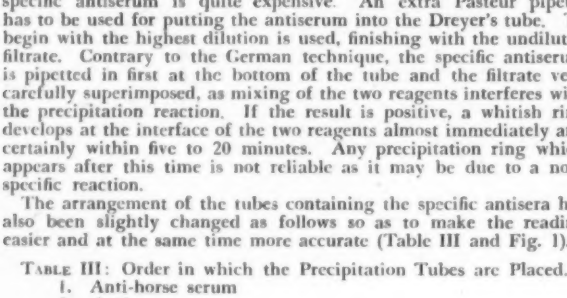

Fig. 1 Order in which the precipitation tubes are placed, Tubes 1 and 3 showing a precipitation ring.

Suspected meat filtrate is added to all except tube No. 7, to which is added horse flesh filtrate.

The first five tubes are the actual indicators, as any reaction therein discloses the origin of the suspected meat sample. Tube No. 6 acts as a control only; tube No. 7 is a good comparison for a positive reaction in tube No. 1, where horse meat is suspected, but may be omitted after experience has been gained in the reading of the results. It is advisable to check every supply of antisera with normal saline before use.

As already mentioned for pure meat, each test under No. 1 to 5 is carried out with the first two dilutions (1:4 and 1:8) and the undiluted filtrate; thus each set is composed of three precipitation tubes.

(*e*) Non-specific Reactions:

Friedberger, Collier and Neumark (cited by Ostertag, 1932) report a non-specific reaction between mutton extract and specific anti-horse serum, and Tietze (cited by Ostertag, 1932) suggests as a remedy the use of a specific anti-sheep serum as a control. This non-specific reaction has also been noticed by the author with 3 per cent. of the samples examined and, therefore, Tietze's suggestion has been adopted, but it was found that other factors also enable a differentiation to be made even without the use of a specific anti-sheep serum. Thus the precipitation ring of a specific reaction between anti-horse serum and horse flesh filtrate is always intense, while that of a non-specific one with mutton filtrate is weak. As a rule, the specific reaction appears almost immediately, while the non-specific one requires anything from five to 20 minutes. The precipitation ring of a specific reaction is pronounced and clearly seen in dilutions of 1:16 and even 1:32, while that produced by a non-specific reaction is seldom seen in the 1:8 dilution and never in the 1:16. Therefore, in every case of a doubtful reaction further dilutions of 1:16 and 1:32 have been made up.

(*f*) Salt Content in Sample:

Schuler (cited by Ostertag, 1932) was the first to point out that a high salt content may upset the precipitation reaction and according to him, a salt concentration of more than 3 per cent. is not permissible. To make a definite border line proves rather difficult as extracts with even a higher salt concentration sometimes give positive precipitation reactions. For normal routine examinations, however, where exceptions cannot be tolerated, the salt content of pickled meats and meat-products must be reduced to a minimum so as to exclude any possible interference with the specificity of the precipitation test. This may be accomplished, as proposed by Schuller, by washing the meat for ten minutes in sterile water, during which period the latter is renewed several times. This method may, however, affect the albumin content of the filtrate; the author, therefore, has abandoned the idea and proceeds as for fresh uncured meat, the only difference being that for setting up the dilutions distilled water is used in place of saline. The undiluted filtrate is of no value because its salt content is usually so high that it is far too heavy to be superimposed successfully on the antiserum, with which it mixes immediately. The dilutions, however, especially the 1:8, supply a very satisfactory antigen.

(*g*) Precipitation Test of Suspected Fat:

For the extraction of unmelted fat Wittels and Welwart (1910) suggest a method whereby 50 grammes of fat, cut into small pieces, are treated in 200 c.c. of normal saline for two hours. The extract is then poured off into another flask containing 50 grammes of cut fat which is again treated for two hours, after which the extract is filtered twice in order to clear it of all fat particles. This method gives good results but may be successfully replaced by the simpler one described for the extraction of pure meat, extracting for 24 hours instead of three. During an initial period of three hours the flask is kept at room temperature and then transferred for the remaining time to a refrigerator. It was noticed that the precipitation reaction of horse fat is always much more pronounced than that of beef tallow, probably due to the difference in the consistency.

(*h*) Precipitation Test of Heated Meat:

Meat samples which have been heated up to 80° C. for 30 minutes give an extract which will not react with sera prepared by the use of unheated material. Rosenberg[9] reports the possibility of producing an antiserum with heated meat juice, but Proom (1945) emphasises that these sera are quite non-specific and he considers it "unlikely that immune sera of practical value can be prepared against cooked meats." As, however, the central parts of thicker meat pieces do not always reach 80° C. it is advisable to extract every meat sample which is sent in for examination as a precipitation test may prove successful. The setting up of dilutions is unnecessary as the albumin concentration in the filtrate, if any, is just sufficient to supply a weak antigen. The extraction of boiled meats has to be extended even up to 30 hours at about 8° C.; an initial three hour period at room temperature is helpful.

DISCUSSION

The precipitation technique as laid down by the German legislation for the identification of meat and meat-food samples suspected to contain horse flesh gives satisfactory results, but has been found susceptible of modifications which both simplify the method and yield even better results.

Using the method suggested, raw meat and unmelted fat as well as meat and meat-products which are cured, smoked or otherwise prepared without being heated for 30 minutes at a temperature of 80° C. supply an antigen for a precipitation test with specific antisera.

The amount of meat taken for the test depends almost entirely on the size of the sample. The proportion of the extracting saline may be kept as suggested by the German legislation or reduced to equal amounts, which as a rule yield a more pronounced precipitation ring.

A clear and unstained antigen is obtained, having the required *p*H and albumin concentration, by diluting the meat extract with normal saline in proportions of 1:4 and 1:8. This also reduces the salt content of concentrated extracts derived from cured meats and assists in the elimination of non-specific reactions between anti-horse serum and mutton extract.

Instead of carrying out several separate procedures in the preparation of the antigen the technique of setting up dilutions, as used in the agglutination test, has been successfully adopted. The antigen thus obtained is clear and unstained, its *p*H is near the neutral point and its albumin concentration satisfactory for the precipitation test. By setting up the four dilutions of the filtrate (1:4, 1:8, 1:16, and 1:32) another important advantage is gained, *viz.*, the elimination of a non-specific reaction which does sometimes occur (in about 3 per cent. of cases) between mutton filtrate and specific anti-horse serum. Finally it makes it possible to

obtain a satisfactory antigen from cured meats, without a preliminary soaking or washing of the sample in question.

The extraction of unmelted fat as suggested by Wittels and Welwart (1910) may be difficult if only a small quantity of material is available. To avoid this, the method used for the extraction of pure meat has been adopted, rendering only one extraction necessary.

Although meat samples which are heated up to 80° C. for 30 minutes do not as a rule supply an antigen which will react with sera prepared with unheated material, it is nevertheless advisable to extract every meat sample as a precipitation test may prove to be successful.

Specific antisera for routine tests should be obtained from reliable sources only. "The preparation of satisfactory precipitating sera for use in identifying animal species by examination of the body fluids or of the tissue extracts requires care and experience" (Proom, 1943). This and the cost of the production of small amounts of antisera make it advisable in the case of routine examinations, to obtain ready made sera from reliable sources. But "even among sera prepared by the same method there may be marked variation in specificity" (Proom, 1943). This should be borne in mind, as it has a profound bearing on the test and the final reading.

Summary

The precipitation test adopted officially in Germany for the detection of adulteration of meat samples is described and a number of modifications suggested which have been found by the author to simplify and improve the test, rendering it directly applicable to unmelted fat and to cured meat, and assisting in the elimination of non-specific reactions.

Acknowledgments.—I wish to express my thanks to Professor A. Robertson for his constructive criticism, to Dr. J. S. Garside for facilities and material, and to Mr. D. J. Brown for his help in carrying out the chemical tests.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Sheep Scab:

Brecon.—The Bungalow, Blaenycwm, Crickhowell, Breconshire (Dec. 10th).

Flints.—Henblas and Bryman Farms, Meliden, Prestatyn, Flints. (Dec. 15th).

Lancs.—Ribble Bank Farm, Hesketh Bank, Preston, Lancs. (Dec. 10th); Broadley Fold Farm, Broadley, Rochdale, Lancs. (Dec. 15th).

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AFRICAN ELEPHANTS FOR WORKING PURPOSES

In a message to his paper, the Salisbury (Rhodesia) correspondent of *The Times* states that interest has been aroused there by a scheme suggested by Lt.-Col. E. H. W. Peacock, a farmer near Umtali, that an experiment should be made of catching African elephants and training them to work on the same lines as the Burmese elephant.

Col. Peacock, in Burma during the war, had a wide experience of elephants there before the war. He has also studied African elephants in the forests of Rhodesia and Mozambique, and is convinced that they could be caught and trained in the same way as Burmese elephants to constitute an important industrial asset and help to solve also the problem of the tsetse fly areas.

A team of instructors from Burma would be required for a start. The cost of the experiment is put at a few thousand pounds, and one suggestion is that it might be shared by member countries of the Central African Council.

CLINICAL COMMUNICATION

Successful Perineal Hernia Operation

J. M. MITCHELL, M.R.C.V.S.

Hampton, Middlesex

Subject.—Brown mongrel collie dog, aged nine years.

History.—A soft reducible swelling, about the size of a large fist, involved the whole region to the right of the anus from the root of the tail to the tuber ischii. Although the swelling had existed for more than a year it was well held by the skin and did not sag heavily downwards to form a hanging pouch as sometimes happens in such cases. However, the anus was involved, being pulled outwards and twisted sideways to face left. The animal was thin and in poor condition and had been given treatment at intervals by other veterinary surgeons for bowel irregularities arising from the hernia. No doubt operation was not attempted because the text-books unite in warning off, except in "selected cases." The writer did not select this case as favourable for surgery but submitted to an owner's "operate or destroy" ultimatum, believing in such circumstances that the "have a go" attitude is the proper line to take in the interests of surgical experience. No urinary symptoms existed and the bladder could be palpated in normal position.

Operation:

The rectum having been cleansed by a saline enema, the patient was deeply anaesthetised by the intravenous injection of nembutal solution. The whole area of swelling was then clipped, shaved, washed and rubbed with spirit. A perpendicular incision was made through the skin directly over the hernial opening which could readily be felt and into which the tips of four fingers in line could easily be placed. No attempt was made to dissect out the hernial sac which became visible immediately under the skin; it contained omentum and serous fluid, about 3 oz. of which was drained out of the wound.

The hernial contents were omentum, rectum, large intestine and small intestine. In replacing these, digital pressure on the rectum, which had sagged into the hernia, stimulated bowel straining in the patient, in spite of the apparent deep anaesthesia which had been induced. The hernial contents were readily returned to the abdomen by the tips of four fingers, but the external wound had to be extended to 5 in. to allow room for the difficult task of inserting the deepest sutures. Around the outside of the hernial opening something like a hernial ring could be appreciated close on the pelvic bones, but to the inside the limits of the hernial opening were very vague and soft so that the placing of sutures and avoidance of the inclusion of omentum or even intestine were difficult. The hernial opening had to be occluded by the finger tips of the left hand whilst three containing sutures were inserted to control the intestines which tended continually to slip back. The only suture material used in the operation was No. 3 nylon. The spaces between the three initial sutures were filled at ½ in. intervals with a layer of interrupted sutures. This deepest layer was about 3 in. from the skin surface and a second layer of sutures was inserted about half an inch further out so as completely to bury the first. A third row was superimposed on the second a little nearer the surface and finally the skin was sutured.

Although there was naturally some slack, due to skin stretching, none was removed and the skin was sutured tightly across the site to leave a projecting "spare tyre" of skin.

After treatment.—The animal was retained in hospital for a week under strict control, on liquid diet and penicillin for three days. Recovery was uneventful; healing was by first intention and external sutures were removed in nine days. The dog was seen again in eight weeks when the perineal region was found to be perfectly normal. The spare tyre of skin had been taken up by contraction during the healing process. To all appearances the general condition also left nothing to be desired.

Weekly Wisdom

". . . the essence of the (second Beveridge) report . . . lies in showing, first, how much individual unhappiness remains untouched by social security and full employment; secondly, how much has been done to diminish unhappiness in the past by voluntary action, inspired by the motives of mutual aid and of philanthropy, or both in combination; thirdly, how urgently voluntary action will be needed in future to supplement and go ahead of public action, to do things which the State cannot do or should not do, or is unlikely to do, as well as they will be done by a specialist pioneer seeing this or that particular evil and setting himself to destroy it. . . ."—Lord Beveridge, *The Times*, October 21st, 1948.

ABSTRACTS

[Penicillin Therapy in Chronic Bovine Mastitis. I.—Sensitivity of Bovine Mastitis Organisms to the Action of Penicillin. Packer, R. A. (1948.) *Amer. J. vet. Res.* **9**, 140.]

The author has tested the sensitivity to penicillin of organisms isolated from cases of mastitis. Only 16 out of 236 cultures of streptococci and staphylococci were able to grow in the presence of 0·125 O.U. No resistant strains of streptococci were found, and there were no marked differences in sensitivity between the three species of mastitis streptococci.

Eight strains of *staphylococcus pyogenes* grew in the presence of 1 to 10 O.U. per ml. None of these strains was isolated from cows which had received penicillin treatment; they were naturally resistant strains.

No evidence was obtained to suggest change in resistance to penicillin occurred during or after penicillin therapy. D. L. H.

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[The Permeability of the Lactating Bovine Mammary Gland to Sulphonamides. Schuhardt, V. T., Carroll, T. B., Rock, A., Lacy, H. (1948.) *Amer. J. vet. Res.* **9**, 144.]

Eight sulphonamides (sulphanilamide, sulphamerazine, sulphathiazole, sulphapyridine, sulphapyrazine, sulphadiazine, 2-sulphanilamido-5-bromopyrimidine and 2-sulphanilamido-5-chloropyrimidine) were given to 18 Jersey cows by mouth in three equal doses of 30 gm. The sulphonamide concentrations in blood and milk were estimated by the method of Bratton and Marshall. Sulphathiozole and sulphapyrazine neither approached a blood concentration of 5 mg. per 100 ml. nor appeared in the milk. Both sulphadiazine and the bromo- and chloro-pyrimidines reached good levels in the blood but failed to appear in the milk. The maximum milk levels of sulphamerazine did not approach those reached in the blood. The blood and milk concentrations in the case of sulphanilamide and sulphapyridine were nearly equal. All the compounds appeared in the milk in their acetylated forms. Mammary tissue seemed capable of acetylation. The authors suggest that although other tissues are permeated by therapeutic concentrations of these sulphonamides, the mammary infection would persist and could serve as a focus for relapse after treatment. Sulphapyridine might be expected to give the best therapeutic effect in mammary infections. F. A.

REVIEW

[Veterinary Clinical Parasitology. Edward A. Benbrook and Margaret W. Sloss. The Iowa State College Press, Ames, Iowa.]

A reference book of this nature has been long awaited. It is divided into three distinct sections, each one comprising a description of the technique for the preparation of specimens and a series of photomicrographs of the objects looked for. Section one deals with the microscopical examination of faeces for the eggs of the common helminths encountered in veterinary practice. The different coccidia and certain larvae are also included. In addition, a number of photographs are shown of pollen grains, partly digested muscle, intestinal flagellates and certain types of particulate matter, which may well be encountered in faecal matter and serve to confuse the viewer. Section two deals with the preparation and examination of skin scrapings for parasitic mites, the third section dealing entirely with lice.

The photographs throughout are of very high quality, and being direct reproduction of what the eye actually sees down the microscope, are of far greater value than drawings could ever be; most are shown both under a low magnification (× 100) and a high one (× 400). There is an extensive bibliography attached which is almost unnecessary in a publication which is of particular value to the student and non-specialist worker.

The work is bound in the manner of a loose-leaf note-book, the pages being held by stiff metal rings, which arrangement allows them to lie flat without damage to the back support, a factor which is invaluable in a book which will inevitably spend much of its life on the laboratory bench, being elbowed and pawed.

IN PARLIAMENT

The Milk (Special Designations) Bill

Second Reading in the Lords

Tuberculosis Eradication Area Proposals to be Discussed with the N.V.M.A.

In the House of Lords on December 14th, Viscount Addison, Lord Privy Seal, moved the second reading of the Milk (Special Designations) Bill, recommending its provisions, as detailed in our issue of December 4th (page 652). Speaking to the general object of ensuring that the public can obtain milk free from any risk of tuberculous infection, Viscount Addison made reference to the objection which had been raised to this method of approach to the solution of the problem, namely, that the provision of such facilities for safeguarding the milk supply might prejudice progress of the more radical method—the eradication of tuberculosis from our dairy herds. Certainly nothing should be allowed to interfere with that, and it was gratifying to know that the number of attested herds in England and Wales had more than doubled in the last four years, representing nearly 1,500,000 cattle. Another feature, which was partly related to this Bill, was the Food and Drugs (Milk and Dairies) Act of 1944, under which certain powers are transferred to the Minister of Agriculture, who becomes responsible for the registration of dairy farmers, the issue of licences and other matters. Many enquiries had been made as to why regulations which had to be framed and put into force for bringing this change into operation had been so long delayed. He understood that quite a crop of legal and technical difficulties had arisen from time to time, and they had seriously delayed the completion of these regulations. He could now inform their Lordships, however, that the Department were able to say that the matter was so advanced that they would be able very shortly to submit a draft of the regulations to the parties concerned—the National Farmers' Union and others—and it was hoped that the regulations would be completed and brought into operation at the same time as that Bill. He was sure they all hoped that that anticipation would be realised, and that under its terms the Ministry would be afforded considerably more authority in the matter of the improvement of our herds.

Earl De La Warr said that the principle of the Bill was accepted. The problem required urgent and drastic treatment but it left them free from the need for panic action. That was one of the reasons why he regretted that the Government should have decided to advance on one leg in dealing with this problem and have introduced a measure dealing with pasteurisation without at the same time announcing their policy with regard to the cleaning up of herds, cowsheds and so on.

With regard to building sites and the cleaning up of cowsheds, the multiplicity of authorities from which we were suffering at the moment, with bordering counties having quite different and often contradictory regulations, had not only been confusing to the farmer but had naturally tended to bring the whole system of inspection into disrepute and contempt. He hoped that the instructions of the Government would be that only the most reasonable necessity would be insisted upon.

They hoped to hear something fairly soon about new measures for encouraging the cleaning up of individual herds. It might or might not be that the present encouragement for the man who was already in the scheme was sufficient, but he was not quite sure about the position of a man who had to take the decision to come into the scheme, and possibly to get rid of a number of his cows by selling them at low prices, because they had not passed the test, and who then had to go into the more expensive "attested" market. He had need of more assistance. Whether it was to be in the form of compensation for cows that he had to dispose of, or in the form of a higher premium, at any rate for the first two or three years, he was not prepared to attempt to dogmatise. But the sooner the Government could tell them what steps they intended to take with regard to this matter, the better. Then again, there was the establishment of clean areas. By "clean areas," he meant those such as the areas—possibly in the Welsh hills and similar country—which might not be suitable for production of milk, but which were very suitable for the rearing of suitable stock, and those for the establishment of new T.T. herds. Again, the sooner they heard from the Government what steps were to be taken in regard to that side of the problem, the better.

Healthy Herds: The Basis of a Sound Milk Policy

Viscount Bledisloe: The basis of a sound milk policy was well-bred and healthy dairy herds. The present Bill departed from the three consecutive stages of a comprehensive programme of milk improvement as laid down in the White Paper, the eradication of tuberculosis from the dairy herd being practically ignored. These three stages, to summarise them, were: the progressive elimination of bovine tuberculosis—and that was to be first; secondly,

the standardisation and simplification of the various regulations and authorities affecting the production and distribution of milk; and, thirdly, closer control over the quality of milk as it reaches the consumer. This Bill dealt with the last stage and, in doing so, in his judgment at any rate, put the cart before the horse—perhaps he should say before two horses, represented by the two other main ideals and intentions adumbrated in the White Paper.

They were told—and he was sure they must all welcome this—that in fact the whole of those three stages were to be undertaken simultaneously. But his chief objection was that this system of improvement, of rendering milk safer by heat treatment, tended to discourage the eradication of bovine tuberculosis. The veterinary profession had for many years past been asking for a bold scheme, based mainly upon this eradication. Vague promises had been made for many years, by or on behalf of the Government, that such a policy would be embarked upon at an early date, and discussions continued between representatives of the Milk Marketing Board, the National Farmers' Union and the Ministry of Agriculture. But in those discussions, he understood, so far, the veterinary profession had not taken any part. He ventured to suggest that it was most desirable, and would be only fair to a great and enlightened profession, that the National Veterinary Medical Association should be called into consultation in this regard.

Lord De La Warr had rightly drawn attention to the fact that although 40 per cent. of the cattle of this country were credited, or rather debited, with probable reaction to the tuberculin test, less than 1 per cent.—he believed he was right in saying no more than one-half of 1 per cent.—actually yielded tuberculous milk. It was only fair to remind their Lordships that, as against that, only one-half of 1 per cent. of all classes of cattle in the United States reacted to the tuberculin test; in Canada about 2 per cent., and in New Zealand about 4 per cent. Perhaps the most illuminating figure of all was disclosed recently in Denmark, which to-day had about one-half of 1 per cent. His great fear was that far from promoting the cleaning up of the herds of Great Britain—a process which by the way was going forward steadily but slowly—this Bill would delay that progress.

Whatever the merits of the policy and procedure contemplated by this Bill, it must not surely be allowed to impede or further postpone the more rapid extension of the activities of the Government to improve the health of our dairy herds. For many years and in spite of the policy adumbrated by the White Paper, the Government had done little more than mark time. Most of the leaders of the veterinary profession had repeatedly stated that bovine tuberculosis could be entirely eradicated in this country within ten or 15 years, provided that an active policy was pursued. Even when the milk was pasteurised, the consumer had the right to demand pure milk from healthy cattle, bottled under the most hygienic conditions. The comparatively small amount of bottling of milk in this country was no credit to us.

Lord Webb-Johnson, welcoming the Bill, said that nothing should be done to delay advance in the eradication of tuberculosis.

Lord Amherst of Hackney said that the Bill would tend to make people feel that milk was safe and thus obscure the position regarding the condition of herds.

The Earl of Listowel, Minister of State for Colonial Affairs, said the Government were not wedded to any one method of improving our milk supply. Discussions with the National Veterinary Medical Association of plans for the reduction of tuberculosis on an area basis were about to take place very soon. But the Government could not wait until the dairy herds of the country were cleaned up. Public health demanded prompt action. The intention was that the Bill should only become operative by stages, by different areas throughout the country. It would first apply to groups of large urban centres of population. It was likely that 12 to 18 months would elapse from the passing of the Bill before any area was ripe for classification. It was not expected that all urban areas would have sufficient pasteurising facilities for the Bill to be applied there in less than five years, while rural areas were expected to take no less than ten years before the whole country was guaranteed against unsafe milk.

* * * * *

Questions

Calves (Transport Conditions)

Lieut.-Colonel Sir Thomas Moore (Dec. 13th) asked the Minister of Food whether arrangements can now be made for young calves to be slaughtered nearer to the grading centres, thereby ensuring that they do not have to endure the hardship of long journeys, standing for long periods and the absence of regular feeding.

Mr. Strachey: The standing instructions to the auctioneers in charge of livestock collecting centres require that any weakly calves purchased for slaughter shall be sent without delay to the nearest slaughterhouse. It is not practicable to do this with all calves, but our local officers are instructed to have full regard to the Transit of Animals Order and to slaughter the calves without delay on arrival.

Sir T. Moore: Is the Minister aware that instructions are really no good? If we have to eat these gentle little things, the Minister must at any rate take precautions to see that their passage to the slaughterhouse is made as easy as possible.

Mr. Royle: Would it be possible to slaughter fewer calves and so help the stocks of beef?

* * * * *

Newly Born Calves (Slaughter)

Mr. Price-White (Dec. 6th) asked the Minister of Food if he is aware of the great increase in the number of new-born calves being sold at prices ranging from £1 to £1 10s. per head to the Ministry of Food for human consumption; how many were so sold for the 12 months ended September 30th, 1948; and will he ensure that a grading system for calves is established so that an adequate number of calves are retained for rearing.

Mr. Strachey: The number of newly born calves purchased by my Department for slaughter has decreased from 671,970 in the 12 months ended September 30th, 1947, to 597,990 in the subsequent 12 months. These include all calves purchased at prices ranging from 10s. to 30s. per head according to size. Other calves are purchased on the basis of grade according to quality and estimated dressed carcase weight. The graders are instructed not to purchase any calves which can be sold for rearing. The grading system for calves appears to be adequate since the number of cattle in Great Britain under one year old on September 4th, 1948, showed an increase of 325,000 on the number for the proceeding year. A subsidy for calf rearing was introduced by the Ministry of Agriculture in August, 1947.

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, December, 1948

List of Successful Candidates

(*Continued from page 676*)

Dublin (*Continued*)

Third Examination (*Revised Syllabus*)

Barnes, M.	Hanly, S.
Doyle, A.	Lawther, S. McK.
Dunn, P. J.	Ronan, W.

Old Syllabus

Collins, T. (H)	Pentland, W. H.
O'Byrne, T. F.	

(H) denotes credit in Hygiene.

Fourth Examination

Barry, J. G.	O'Connell, T. J.
Cahill, P.	O'Kelly, C. D.
Gilmore, D. J.	Rosney, P. C.
Lyttle, C. N.	Stewart, Paul
McClancy, B. N.	Thornton, I. M. (Paras)
Murphy, J. J.	

(Paras) denotes credit in Parasitology.

Final Examination

Byrne, P. F.	Mundy, W. A.
Coghlan, M. J.	O'Nuallain, T.
Dawson, R. M.	Polden, A. W.
Galvin, T. A.	Quaid, T. F.
Jennings, R.	Treacy, J. T. M.
Kavanagh, Desmond	Walker, D. A.
Knightly, Michael	Walsh, E. A.
Loughran, P. K.	Woods, R. H.

Edinburgh

First Examination

Fraser, J. S.	Maybin, James
Goss, C. J.	Mitchell, A. W.
Hutchinson, H. L.	Tremlett, J. G.
McCormick, A. N.	Watt, D. J.
Macqueen, A. C. W. E.	Wilson, P. G. R.

SECOND EXAMINATION

Beck, C. J.
Butcher, Miss J. P.
Campbell, Kenneth
Crawford, Miss H. F.
Evans, T. D.
Gonzales, F. O.
*Hildebrand, W. R. P.
Plummer, G. A.
Sanderson, J. F.
Thoma, J. W.
Watkins, L. S.

* denotes 2nd class honours.

THIRD EXAMINATION

Argo, Edward
Brown, A. J.
Clarke, James
Condy, J. B.
Gardiner, A. D. L.
Gibson, W. W. C.
Glover, T. D. (A)
Hardie, Henry
Henderson, G. N.
McFadyean, C. A.
Madden, D. H. L.
Marr, T. G.
Mitchell, J. R.
Ogonowski, K.
Perrin, Miss P. E. V. (London student)
Philip, H. M.
Robson, T. W. (A)
Smith, I. A.
Tarala, Jan
Walker, Denis
Waterlow, Miss J.
Waterston, R. F. (H)
Westcott, E. V. (Liverpool student)
Williamson, P. T. (A)

(A) denotes credit in Anatomy.
(H) denotes credit in Hygiene.

FOURTH EXAMINATION

Anstruther, Miss J. D.
Auchterlonie, D. (Paras)
Birrell, Miss E. E.
Branagan, Denis
Burns, K. N.
Cormack, J. G.
Drake, J. N.
Field, John
Finlay, R. A.
Hamilton, H. A.
Jones, E. E.
Loxam, J. G.
Malone, G. S. R.
Raine, W. A. S. (Path)
Reid, G. M.
Rylands, J. M.
Stewart, G. H. G.
Wright, Charles

(Path) denotes credit in Pathology.
(Paras) denotes credit in Parasitology.

FINAL EXAMINATION

Bayliss, John
Brotherton, P. N.
Dawson, C. D.
Fawell, E. V.
Ferguson, James
Hall, J. H. (M)
Kay, R. N.
Munro, I. B.
Murphy, Stanley
Rayne, Philip
Routledge, D. E.
Simms, I. H.
Smith, S. R. H.
Walker, Charles
Watrach, A. M.
Watson, Harry (M)
Wight, P. A. L.

(M) denotes credit in Medicine.

Liverpool

SECOND EXAMINATION

Both Subjects

Boyt, W. P.
*Clarke, P. B.
Davies, G. P. (A)
Dawkins, H. P.
Evans, A. N. (A)
Fairhead, A. C. W. (A)
Gunner, D. E.
Hudson, J. H.
Hyslop, N. St. G.
James, R. H.
Johnson, R. H. (A)
*Jones, E. H.
Keay, A. J.
Kenworthy, R. (A)
Leighton, G. R.
Lewis, J. O. (A)
*Lucas, J. M. S.
Pryce, R. L. (A)
*Randle, P. O.
Roberts, H. G.
Roddis, A. F. (A)
Steele, C.
*Vaughan, K. L.
Woods, A. J.

One Subject

Edwards, D. K. (A)
Hughes, P. A.
Jones, K. W. R.
Leach, S.

* denotes 2nd class honours.
(A) denotes credit in Anatomy.

FOURTH EXAMINATION

Cundle, Miss E. C.
Davies, E. L.
Earl, N. M.
Forster, P. E.
Grime, P. A.
Hewett, M. J.
Humphries, Miss S. M.
Jones, J. G.
Parkinson, W. G.
Teer, J. P. (Paras)
Theobald, C. G.
Whitfield, G. D.
Woodhead, A. T.

(Paras) denotes credit in Parasitology.

FINAL EXAMINATION

Aston, K. R.
Carter, N. S.
Clark, W. A.
Griffiths, L.
Jones, Elwyn
Morris, John

Glasgow

FIRST EXAMINATION

Buchanan, J. M.
Crawford, T. G.
*Cunningham, M. P.
Gracie, D. K.
Haresnape, I. C.
Loudon, A. J. B.
McCusker, H. B.
Orr, Miss M.
Roy, James
*Watt, W. R.

* denotes Second Class Honours.

SECOND EXAMINATION

Anderson, I. H.
Bunyan, F. S. R.
Dick, I. B.
Fitzsimmons, W. M.
Jackson, W. G.
Lyons, A. R.
Moffat, Robt.
Mundell, David
Nelson, John
Russell, D. A.
Sanderson, John
Skinner, D. I.
Thompson, J. D.
Waddelow, I. R.
Walls, T. J. R.
Whiteford, Miss J.

THIRD EXAMINATION

Anderson, Miss J.
Baker, Norman
Crighton, G. W.
Doak, Miss M. S. P.
Doyle, Joseph
Fraser, A. F.
Gallagher, Peter (A) (H)
McDougall, J. S.
McKay, T. M.
McKerrell, A. L. L.
Ostler, D. C.
Patra, B. N.
Peritz, F. J.
Robertson, W. W.
Spiers, A. G. (A)
Sturdy, I. C.
Thomson, T.
Wilcox, W. H.
Wilson, J. S. S.

(A) denotes credit in Anatomy.
(H) denotes credit in Hygiene.

FOURTH EXAMINATION

Aitken, G.
Bain, Miss M. L.
Ferguson, Wm.
Garrett, J. A. L. (Paras)
Gilchrist, J. A. S.
Gillies, R. J. M. (Paras)
Grisedale, J. A.
Higgins, A.
Horn, W. R.
Lawson, John
McAdoo, S. D.
Mackie, A. M.
Maclennan, Donald
Mount, Miss E. D.

(Paras) denotes credit in Parasitology.

FINAL EXAMINATION

Finkelstein, B.
Frame, James
Galloway, J. D.
Greig, Miss J. (M)
Hillman, R. W.
Jackson, W. T.
Lustig, M. (S)
McFarland, M. J.
Mackay, Angus
Maclure, W. B.
Mair, C. P.
Offord, E. C.
Ritchie, N. D.

(M) denotes credit in Medicine.
(S) denotes credit in Surgery.

WELSH DEMAND FOR A VETERINARY FACULTY

At the annual meeting of the Court of the University of Wales, held at Swansea University College on December 15th, the Court received resolutions from the committee of the Welsh County and County Borough Councils and the Association of Welsh Local Authorities upon veterinary education in Wales.

The latter's resolution recorded profound regret that Wales was not included alongside Bristol and Cambridge in the Veterinary Surgeons Bill, and pledged full support to those concerned in securing forthwith the provision of complete veterinary training facilities in Wales on a plane of equality with those provided in other parts of Britain.

The Court received a report that the University Council had appointed a committee to consider the question of formulating, for presentation to the University Grants Committee, the claims of the University of Wales for the financial assistance required to establish a veterinary faculty in the Principality.

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James Clark: *Corrigendum.—Vet. Rec.* **60**, 662, *for* the year 1778 given as the date of the first publication of Clark's second text-book, *read* 1788.

NOTES AND NEWS

Diary of Events

Jan. 5th, 6th and 7th, 1949.—Quarterly Meetings of Council and Committees, N.V.M.A., in London.

Jan. 5th.—Meeting of the Southern Counties Division, N.V.M.A., at Salisbury (Red Lion Hotel), 2.30 p.m.

Jan. 6th.—Meeting of the Central Veterinary Society, at the Royal Veterinary College, Camden Town, 6 p.m.

Jan. 7th.—General Meeting of Association of Veterinary Teachers and Research Workers (Southern Region), at Royal Veterinary College, N.W.1, 11.30 a.m.

Jan. 10th to 13th, 1949.—R.C.V.S. Council and Committees, 10, Red Lion Square, London, W.C.1.

Jan. 21st.—157th Annual Ball of R.V.C., at Grosvenor House,

Jan. 25th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington (Midland Agricultural College), 2.15 p.m.

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Further Veterinary Products Freed from Purchase Tax

When the Association recently became aware that the list of products used in veterinary practice which are exempt from purchase tax was under review, it made strong representations to H.M. Commissioners of Customs and Excise.

The Association's claim that veterinary biological products as a whole be exempted was not accepted but the matter was pursued by the suggestion of an extension of the list of agents hitherto exempt. By the issue of The Purchase Tax (No. 5) Order, 1948, the majority of the products for which exemption was claimed have now been added to the list of preparations free of purchase tax. These additions are:—

Sera and antitoxins, the following:
- Anti-black-disease serum.
- Anti-canine-distemper serum.
- Anti-haemorrhagic-septicaemia serum.
- *Clostridium pyogenes* serum.
- Mixed or polyvalent sera whose components are exempt from tax.
- Pregnant mares' serum.

Vaccines, the following:
- Black disease vaccine.
- Contagious pustular dermatitis (Orf) vaccine.
- Haemorrhagic septicaemia vaccine.
- Leptospira vaccine.

Canine distemper prophylactics, Method I vaccine and virus. Method II virus and serum.

These products became exempt from purchase tax on December 15th, 1948.

* * * * *

Dangerous Drugs Regulations, 1948

The Dangerous Drugs Regulations, 1948, made on December 6th, were laid before Parliament on December 8th, and come into operation on January 1st, 1949.

New Regulation 1 extends the authority given by the principal Regulations (Dangerous Drugs Regulations, 1937) to registered veterinary surgeons to be in possession of, to supply, and to prescribe Dangerous Drugs to persons on the Supplementary Veterinary Register.

By new Regulation 4, the following paragraph is added to Regulation 5 of the principal Regulations (which authorises members of certain classes of person specified in the Regulation to be in possession of, and to supply, drugs for certain purposes):—

(2) Every drug or preparation in the actual custody of a person authorised by virtue of this Regulation shall, except when the necessities of the practice of the profession, function or employment by virtue of which that person is authorised as aforesaid otherwise require, be kept in a locked receptacle which can be opened only by him or by some other person authorised by virtue of this Regulation.

New Regulation 6 secures that where the authority of an assistant to an authorised seller of poisons to possess and supply Dangerous Drugs has been withdrawn, he shall not have access to the authorised seller's supplies.

New Regulation 9 inserts in sub-paragraph (*a*) of paragraph (1) of Regulation 11 of the principal Regulations (which provides that every person authorised to supply drugs shall keep a register, and requires the entry of certain particulars in the register) after the words "and enter therein" the words "in chronological sequence."

Separate registers or parts of the register are to be kept for
- (ix) pethidine and preparations containing pethidine,
- (x) amidone and preparations containing amidone.

Raw Opium Regulations, 1948

The Raw Opium Regulations, 1948, made on December 6th, were laid before Parliament on December 8th, and come into force on January 1st, 1949.

The new Regulation 1 extends the authority given by Regulation 4 and the Raw Opium Regulations, 1937, to registered veterinary surgeons to be in possession of and to supply raw opium, etc., to persons registered in the Supplementary Veterinary Register (Veterinary Surgeons Act, 1948).

New Regulation 3 adds to Regulation 4 of the principal Regulations (which authorises members of certain classes of person specified in the Regulation to be in possession of, and to supply, raw opium and certain other substances for certain purposes) the following paragraph:—

"(2) Every drug in the actual custody of a person authorised by virtue of this Regulation shall, except when the necessities of the practice of the profession, function or employment by virtue of which that person is authorised as aforesaid otherwise require, be kept in a locked receptacle which can be opened only by him or by some other person authorised by virtue of this Regulation."

New Regulation 4 adds the words "in chronological sequence" after "and enter therein" to paragraph (*a*) of Regulation 6 of the principal Regulations (which provides that every person authorised to supply raw opium and certain other substances shall keep a register, and requires the entry of certain particulars in the register).

Copies of both sets of Regulations (S.I. Nos. 2653 and 2654) may be obtained from the Stationery Office, price 1d. each.

. . . . .

The Dangerous Drugs Regulations, reproduced above, which come into force on January 1st, 1949, are mainly consequential upon the passing of other statutes which have been introduced since 1937 when the last Regulations were issued. The new amendments place persons whose names appear in the Supplementary Veterinary Register set up in pursuance of the Veterinary Surgeons Act, 1948, in the same position as registered veterinary surgeons in respect of the possession, supply or prescribing of Dangerous Drugs.

The necessity of keeping Dangerous Drugs in a locked receptacle is now extended by Regulation 4 to all authorised persons, whereas the 1937 Regulations confined this requirement to pharmacists. An explanatory memorandum issued by the Home Office points out that the room of a house, or a motor car, cannot be regarded as a "receptacle," although a cupboard in a room can properly be so regarded. *It will be noted that except in so far as the necessities of the practice of their profession demand, all doctors, dentists and veterinary surgeons must now observe this requirement.*

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PERSONAL

The new President of the Farmers' Club.—The many members of the profession who, prior to 1946, enjoyed his guidance round the National Institute for Research in Dairying while he was at Reading, will be interested to learn that after 31 years' membership Mr. James Mackintosh has been honoured with the Chairmanship of the Farmers' Club in succession to Sir Patrick Gower. One of the best known figures in the dairy world, Mr. Mackintosh was the President of the English Guernsey Cattle Society in 1947 and is a Council member of the British Dairy Farmers' Association and of the Shorthorn Society.

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Marriages.—Anderson—Paisley.—At the Congregational Church, Romford, Essex, on December 11th, 1948, by the Rev. R. Ward, B.A., John Arneil Anderson, M.R.C.V.S., son of Mr. and Mrs. D. R. Anderson, 16, Vennard Gardens, Glasgow, to Jean Isobel, daughter of Mr. and Mrs. R. Paisley, The Outspan, 40, Roslyn Gardens, Gidea Park, Romford, Essex.

Carmichael—Day.—At Glasgow, on December 15th, 1948, Michael Alexander Carmichael, B.Sc., M.R.C.V.S., Fort William, to Nancy Cowan Day, Glasgow.

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R.C.V.S. OBITUARY

Murts, William Edwin, Senior Veterinary Surgeon to Our Dumb Friends' League, 1, Hugh Street, Belgrave Road, London, S.W.1. Graduated London, December 15th, 1897. Died December 14th, 1948.

Mr. William Edwin Murts, M.R.C.V.S.

A Tribute

Mr. E. Keith Robinson, Secretary of Our Dumb Friends' League, writes:

May I pay this tribute to the late William Edwin Murts, M.R.C.V.S., who passed away on December 14th.

I knew Mr. Murts for nearly 30 years, before becoming finally closely associated with him, for the last 15 years, when he became the Resident Veterinary Surgeon to the League.

During the whole of his life he was ever conscious of the suffering of animals, and devoted a large part, and lately the whole, of his time to work for those who could not afford veterinary fees—let it be said, in his early days often to the detriment of his private practice.

There are many who will miss Mr. Murts, and will mourn his passing; his kindliness to those in distress with their pets was as great as his skill in healing the ills of their animals.

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Proposed Veterinary Research Centre for the North of England

At a meeting of prominent agriculturists at York, convened jointly by *The Yorkshire Post* and the Animal Health Trust, and held on Thursday of last week, the first step was taken towards the foundation of a veterinary research centre situated in the North of England, by establishing a working committee.

In its report of the proceedings, the *Post* states that the chair at the meeting was taken by Lt.-Col. Sir John A. Dunnington-Jefferson and that amongst those present were the Earl of Scarbrough, Sir William Prince-Smith, Bart., Professor J. McGregor, representing the University of Leeds, Dr. W. R. Wooldridge (Scientific Director) and Sir Cleveland Fyfe (Organising Secretary) of the Animal Health Trust, the chairmen and secretaries of the four Yorkshire county branches of the National Farmers' Union, representatives of the dairy, poultry, pig and hill farming industries, Capt. C. G. Y. Skipwith, Mr. A. P. Seery, Mr. B. T. Clegg, Mr. G. O. Powley, Yorkshire Organiser of the Animal Health Trust, Mr. F. M. Baldwin and Mr. John L. Illingworth.

Mr. W. L. Andrews, editor of *The Yorkshire Post*, sent a message expressing the paper's eagerness to help the farmers.

The chairman said the origin of the meeting lay in the article on the need for a research centre, which had appeared in *The Yorkshire Post* of November 27th; it was the indictment and challenge contained in it which the meeting had to consider.

Dr. W. R. Wooldridge, Chairman of Council and Scientific Director of the Animal Health Trust, said that the Trust would do all in its power to aid the North to erase that indictment and to meet that challenge. He thought that Leeds was the obvious place for the establishment of such a centre, since there the station could work in close collaboration with the University, which it would need to do.

Two difficulties lay in the way: finance—a fully equipped station would cost at least £20,000 a year exclusive of capital charges—and the acute shortage of veterinary research workers. The former, he was sure, would be overcome; the latter was the more serious but the Trust, by the provision of post-graduate scholarships to promising young workers, was already preparing to meet it. It might be that this shortage, especially of senior researchers, might delay the setting up of a full research station.

He went on to say the Trust was engaged in the establishment of new centres of poultry and bovine research at St. Ives. He suggested that the northern station should start its career as a centre for the investigation of sheep diseases, the Trust diverting to it work of this nature from St. Ives, and add the other farm animals to its orbit as available staff permitted.

Professor J. McGregor said that he was instructed by the Vice-Chancellor of Leeds University to convey the University's deep interest in the scheme and the offer of the closest collaboration between the University, and especially its departments of Medicine and Agriculture, with such a station, whatever the nature of its link with the University.

A long discussion followed which made it clear that the difficulties of staffing were fully appreciated, and that the station should work in close co-operation with the University of Leeds.

The following resolution was then proposed by the Earl of Scarbrough and carried unanimously:—

"Resolved that it is the opinion of this meeting that a veterinary research centre in the North of England is an urgent necessity and that this meeting invites the fullest co-operation from the Animal Health Trust."

The meeting then discussed the constitution of a working committee which should negotiate details with the Trust, invite the collaboration of the other counties of the North and launch the necessary appeals.

It was agreed that the Yorkshire Agricultural Society should be asked to nominate two members to this committee, the four county branches of the N.F.U. one member each and the Central Landowners' Association one member; the nucleus thus formed will proceed to invite representation from other organisations. In addition Mr. G. O. Powley was nominated to the committee, and Mr. F. M. Baldwin, Secretary of the Yorkshire Agricultural Society, and Mr. John L. Illingworth, Agricultural Correspondent of *The Yorkshire Post* were appointed as Joint Honorary Secretaries

* * * * *

INSPECTION OF MEAT AT "PET FOOD STORES"

Birmingham Deals with a Threat to Public Health

Meat offered for sale at "pet food stores" is often unsound, and sometimes affected with tuberculous lesions. There is an obvious danger of dogs and cats contracting tuberculosis from this source, unless the meat is thoroughly cooked; but the danger to animal owners handling such meat before cooking is even greater.

These facts have been appreciated in Birmingham where, at the suggestion of Mr. C. G. Allen, the Chief Veterinary Officer, the Corporation has obtained from Parliament powers to make by-laws as follows:—

(*a*) for requiring the sterilisation in such manner as may be prescribed by the by-laws of animal feeding meat exposed or offered for sale for consumption by dogs, cats or other animals;

(b) for prohibiting the sale or offer or exposure for sale of animal feeding meat for consumption by dogs, cats or other animals unless such meat has been so sterilised;

(*c*) for empowering any duly authorised officer of the Corporation to examine any animal feeding meat which is offered or exposed for sale for consumption by dogs, cats or other animals and to seize and destroy or cause to be destroyed such animal feeding meat if it has not been so sterilised as aforesaid.

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Dishorning and the Law

The following letter appeared in the issue of *The Farmers' Weekly* of December 17th:

Sir,—In your issue of December 3rd, Mr. A. G. Street enquired the attitude of the veterinary profession towards the dishorning of cattle. There still exists in agricultural circles some level of opposition to this practice and so long as it exists it is not unreasonable that some members of the veterinary profession—so closely allied to the livestock industry—will share that view or prejudice, whichever it may be.

Within the limits imposed by the law of the land, the profession has, however, played its part by encouraging dishorning in suitable circumstances. We are aware that many hundreds of adult stock have been dishorned and far greater numbers of calves disbudded by veterinary surgeons up and down the country, and we know of no instance in which one of our members has refused to carry out this work.

What Mr. Street must realise is that the Animals Anaesthetics Act has made it necessary to use a general anaesthetic in dishorning adult stock. For some years, this Association has been pressing the Ministry of Agriculture to revise the Act, in view of the many anomalies it contains and in the light of the great progress made in the application of anaesthesia, both local and general, to all classes of stock. Since the Ministry has not found it possible to have a thorough revision carried out, the amendment regarding dishorning—to remove one of the anomalies and allow the use of nerve-block anaesthesia—was readily accepted.

Mr. Street can be assured that although it has not been possible in this country to practise the dishorning of adult stock under local anaesthesia, the profession knows the technique well and will be ready to undertake the work when called upon. The information available from other countries confirms that nerve block anaesthesia allows dishorning to be carried out in a painless manner with the minimum of interference to the animal and its productivity.

It will be appreciated, however, that the type of anaesthesia used when the Amending Order becomes operative will depend upon the conditions existing on the farm and be at the discretion of the veterinary surgeon responsible for the operation.

R. F. Montgomerie,
President, National Veterinary Medical Association.

36, Gordon Square,
London, W.C.1.

COMMONWEALTH AND EMPIRE HEALTH AND TUBERCULOSIS CONFERENCE

Organised by the National Association for the Prevention of Tuberculosis, the second Commonwealth and Empire Health and Tuberculosis Conference will be held at the Central Hall, London (opposite Westminster Abbey), on July 5th, 6th, 7th and 8th, 1949.

Speakers will include distinguished personalities from Great Britain, the British Commonwealth, and other countries, and there will be opportunity for members of the conference to address the assembly.

Protection from bovine tuberculosis infection is a feature of the Provisional Programme, which also includes the following subjects: Tuberculosis as a world problem; Trends in the modern treatment for tuberculosis including Streptomycin and P.A.S.; Regional county tuberculosis schemes; Organisation of comprehensive tuberculosis schemes in a British Colony; Problems in the prevention and detection of tuberculosis: (*a*) Tuberculosis among nurses and students; (*b*) The policy of B.C.G. administration, and Psychological and social re-adaptation in industry.

Full particulars may be obtained from the Secretary-General, The National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, London, W.C.1. In the meantime, the following information may be of service:—

Fees.—The conference fee is three guineas for the four days, or one guinea for a single day or session.

Transactions.—The proceedings of the conference will be published verbatim, and a copy will be supplied free to every member. Additional copies will be available, price 15s.

Travel and Accommodation.—Messrs. Thomas Cook & Son, Ltd., are acting as travel agents for the conference, and their services are therefore at the disposal of conference members.

Exhibition.—A large Exhibition of X-ray apparatus, pharmaceutical products, patients' handicrafts, medical and technical books, maps, plans, etc., will be open during the conference.

Entertainments and Visits.—Entertainments, and visits to sanatoria, hospitals, clinics, and places of general interest will be arranged for conference members. A small supplementary charge for travel will be made in connection with some of these visits.

Tuberculosis Prevention Association's Jubilee

On December 16th the National Association for the Prevention of Tuberculosis celebrated its jubilee, and the December issue of its *Bulletin* contains a congratulatory message from the King, who recalls the inauguration of the association by his grandfather, King Edward VII, and quotes his famous question in reference to this disease—"If preventible, why not prevented?"

"The N.A.P.T.," says the Medical Correspondent of *The Times*, "can rightly claim to have played an important part in answering this question. 'In the year 1898,' states the *Bulletin*, 'some 36,000,000 people lived in England and Scotland and 70,000 lives were lost through tuberculosis: in 1948, half a century after, the number of deaths from this cause is likely to be less than 27,000, although the population has risen to 48,000,000.'

"It is claimed that in 50 years there has been a saving of 1,500,000 lives. The N.A.P.T. policy has been to press for education of the public, the provision of a pure milk supply, and the erection of sanatoria. In recent years particular attention has been paid to the problem of tuberculosis in the British Empire."

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ALLEGED EMISSION OF NOXIOUS FUMES AT FORT WILLIAM

It is expected that the report by the committee of the Medical Research Council on the alleged emission of noxious fumes from near Fort William will be published next month.

This has been announced by Lord Morrison in reply to a Parliamentary question by Viscount Stonehaven, who asked whether the Government could amplify their answer given to the question of December 4th, 1946, on the emission of noxious fumes by North British Aluminium near Fort William, having regard to the fact that the report of the Committee of the Medical Research Council had been in the hands of the Ministry concerned since 1947; and whether the Government would make the report public, observing that a certain local authority had received copies of extracts of this report which included a statement that "The effects on animal husbandry of fluorine contamination of herbage have been described in detail. They obviously constitute a serious impediment to economic methods of sheep and cattle farming in the area. It is important that everything practicable should be done to reduce the amount of fluorine discharged from the factory." He also asked whether, observing that the public were protected against the emission of hydrochloric acid fumes into the atmosphere, by Government regulations, the Government would bring the emission of the much more toxic hydrofluoric acid fumes into the atmosphere under similar appropriate regulations.

Lord Morrison, in a written reply, states: "I am informed that the report of the Committee of the Medical Research Council which has been investigating the medical and veterinary aspects of this matter has recently been completed. I understand that there has been some difficulty in compiling and editing the report in its final form, as it is based on the contributions of a number of individual investigators.

"The report is now with the printers, and it is hoped to publish it in January.

"I am further informed that an action for interdict against the company responsible for the factory concerned is at present before the Court of Session. The issues involved, in relation to the operations of the factory, are difficult and have far-reaching implications. The whole matter will be considered as one of urgency as soon as the legal action has been determined."

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MINISTRY OF AGRICULTURE NEWS SERVICE

Poultry Stock Improvement Plan.—No poultry enterprise can prosper unless it is built on a firm foundation of vigorous healthy and productive stock. Consequently the wise farmer will select with great care the source from which he gets his breeding birds or annual replacements. In this task he is assisted by a nation-wide scheme, now in its 15th year, and based on the accumulated experience and practice of the most successful geneticists and breeders.

The need for a national plan of this kind is generally accepted by the poultry industry as a progressive step towards a steady improvement of our poultry flocks. It should be the aim of all producers, whether general farmers or specialist poultry keepers, to attain their ultimate object of maximum egg yields. This is especially necessary if the egg target is to be reached within the time limit of the next four years. The Poultry Stock Improvement Plan, with its close control both of quality and disease, offers to all a sound source of supply from which satisfactory disease-free stock may be obtained.

County lists of Accredited Breeders and Accredited Hatcheries containing the names and addresses of all fully accredited breeders in the county are now available free of charge from County or Provincial Offices of the National Agricultural Advisory Service.

A Register of Accredited Poultry Breeding Stations and Accredited Hatcheries in England and Wales, with details of their stock, will be published early in the New Year under the general title of The Poultry Stock Improvement Plan. It will be obtainable free and post free from the Poultry Branch of the Ministry of Agriculture and Fisheries at 1, St. Andrew's Place, Regent's Park, London, N.W.1.

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The Agricultural Marketing Bill.—The Minister announced in the House of Commons on May 31st last that the main recommendations of the Lucas Committee raise issues of such far-reaching importance that they must be further examined in relation to wider problems of procurement, marketing and distribution and, in the meantime, legislation would be prepared to effect a number of necessary and desirable amendments to the Agricultural Marketing Acts, 1931 to 1933. The proposed amendments have now been published in the Agricultural Marketing Bill which was given a first reading in the House of Commons on December 3rd. The Bill takes account of the recommendations in Chapter 7 of the Lucas Report and of the relevant recommendations of the Departmental Committee on the Imposition of Penalties, whose report was published in 1939.

The Agricultural Marketing Bill proposes that the Minister should be empowered to appoint at least two and up to one-fifth of the members of a marketing board and to give the Ministers powers to issue directions to a board if it appears to him that some action, or failure to take action, by the board is likely to produce certain results, defined in the Bill, and that those results would be contrary to the public interest. The Minister will be required to give notice of his intention to the board concerned and, if requested by the Board, to refer the matter to a Committee of Investigation.

As recommended by the Committee on the Imposition of Penalties, the Bill provides that penalties should not be imposed by a whole board but by a Disciplinary Committee of a board with an independent chairman with legal experience, approved by the Minister.

Some of the recommendations of the Lucas Committee for extending the powers of boards in matters affecting the production of the regulated product are incorporated in the Bill, which also provides for the repeal of provisions authorising development schemes for organising the production of secondary agricultural products.

'BRACKEN OR BEEF"?

We have increased the production of milk by 25 per cent. compared with pre-war. We believe a similar and probably still greater increase is possible in meat supplies. But how? We suggest that the first stage is to turn our eyes from the jungles of Africa and the "badlands" of Queensland, and to look at the hundreds of thousands, possibly millions, of acres of useful land in this country which are now carrying less than a sheep to the acre, where they could be carrying a bullock. We now have 17,579,000 sheep in Great Britain. In 1868 we had 30,711,396. . . . There was good meat produced on roots and grass which never saw oil cake, and there are thousands of acres of land still showing the marks of our grandfathers' ploughs which we, with all our technical advances, have abandoned to bracken and crows."—*Farmers' Weekly.*

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Stretford Corporation reports the receipt of a communication from the Manchester Markets Department to the effect that they, as owners of the Mode Wheel Cattle Market, have received an application for the tenancy of the emergency slaughterhouse for the purpose of slaughtering goats—the flesh of which is intended for human consumption—and enquiring whether the Stretford Council as health authority would be likely to raise any objections. Before coming to a decision, however, the chief sanitary inspector of Stretford is to inform them that if the slaughterhouse is to be used for this purpose, structural repairs, adequate cleansing, and the provision of hot water will be necessary.—*Meat Trades Journal.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible.

CARCASE DISPOSAL CENTRES

Sir,—A recent issue (*Veterinary Record*, No. 47, Vol. 60) has stimulated me to write on a subject which has been prominent in my mind for some time. The vivid accounts of the preparation of cooked meats, the wholesale slaughter of horses, and the disturbing reminders of the state of the slaughtering and meat inspection system in this country are all deserving of lengthy comment. But the issue also contains reference to contravention of food regulations involving knackers' yards. In reply to a question, the Parliamentary Secretary to the Ministry of Food said, ". . . enforcement officers have paid special attention to knackers' yards in recent months" and that control over the disposal of meat has been strengthened by the introduction of an order, whereby a record of transactions must be kept.

The very name "Knackers' Yard" must conjure in the mind of all country practitioners most horrible apparitions. These centres for the disposal of carcases unfit for human consumption, are invariably in the hands of individuals working under the most unpleasant conditions of filth, darkness and disease, with only the bare essentials of slaughtering equipment, searching in a carcase for something on which to dab some green dye and for which they will receive eightpence per pound.

Have State departments, universities, colleges, or scientifically minded individuals never contemplated organising such centres? They would provide not only an ample supply of pathological material for research and teaching, but an invaluable source of statistics relating to animal disease. Full use could be made of the meat, bones, hides, blood and glands, and they could not fail to be a profitable undertaking.

There can surely be none more interested than we in the veterinary profession; and if, in fact, knackers' yards are at last coming to the notice of one Government department, might not the time be ripe for proper organisation of these disposal centres? I would like to suggest that State "Disposal Centres" be set up under veterinary supervision, perhaps attached to veterinary investigation centres, veterinary schools, pathological and research laboratories, wherein we would have somewhere to turn for information and accurate statistics on such matters as abnormalities of bovine genitalia, parasitism, tuberculosis, mastitis, actinomycosis, traumatic pericarditis, sheep mortality, osseous lesions in horses, and grass sickness. Somewhere, at last, where one can perform *post-mortem* examinations under congenial conditions, and where facilities and advice would be available from pathologist colleagues.

I hope my remarks on this subject are worthy of comment and that members will express their views and constructive suggestions.

Yours faithfully,

PETER KIDDLE.

Bull Farm,
King's Worthy,
Winchester.
December 6th, 1948.

DEHORNING OF CATTLE

Sir,—For many years past the R.S.P.C.A. has advocated that it would be better if dehorning—*i.e.*, preventing the horns of a calf from growing—were a general practice in this country. This advice is now coming to be accepted, but the matter has gone even further and the dis-horning of adult cattle threatens to become a craze in various parts of the country. Unless the operation is carried out by a veterinary surgeon, under an appropriate anaesthetic, considerable suffering can result and we do beg the profession to use all their influence with stockbreeders, to ensure that satisfactory methods are employed.

An eminent veterinary surgeon advises me that the rubber ring technique for dehorning is to be deprecated because it must leave a partially attached horn wobbling about on its sensitive core for many days before complete separation. Knocks and bumps in the byre and out of doors must cause great suffering.

Yours faithfully,

ARTHUR W. MOSS,
Chief Secretary.

Royal Society for the Prevention of Cruelty to Animals,
105, Jermyn Street, London, S.W.1.
December 12th, 1948.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Nov. 16th to 30th, 1948	3	7	1	—	6	1
Corresponding period in—						
1947	7	—	268	—	2	1
1946	5	2	—	—	5	4
1945	3	2	—	—	2	24
Jan. 1st to Nov. 30, 1948	101	11	254	1	60	27
Corresponding period in—						
1947	111	103	2,065	1	76	34
1946	87	37	—	7	90	340
1945	113	125	—	6	110	891

NOTE.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at November 30th, 1948, was as follows:—

ENGLAND	WALES	SCOTLAND	TOTAL (GREAT BRITAIN)
12,801	12,245	11,056	36,102

ADVERTISERS' ANNOUNCEMENTS

Evans Medical Supplies, Ltd., of Liverpool and London, wish to state that the price of Pulpy Kidney Serum (Evans) was increased a short while ago to 12s. for 50 c.c. containers and 22s. 6d. for 100 c.c. containers. Increased production costs have necessitated this increase.

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Burroughs Wellcome & Co. announce that the following 'Wellcome' brand veterinary products are now freed from Purchase Tax:—
Canine Distemper Prophylactics Method I and Method II.
Canine Anti-Distemper Serum.
Pregnant Mares Serum (P.M.S.).
C. Pyogenes Anti-serum.
Black Disease Vaccine and Anti-serum.
Contagious Pustular Dermatitis (Orf) Vaccine.
Leptospira Vaccine.

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Purchase Tax Exemptions

C. J. Hewlett & Son, Ltd., announce that, in accordance with the Purchase Tax No. 5 Order, 1948, the following are not now subject to Tax: Hormonigen Tablets, Hormonigen Elixir, Ampoules of Cardiac Tonic and Hewlett's Sarcogen.